On the Need for Prospective Disaster Survey Panels

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In press, *Disaster Medicine and Public Health Preparedness*

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Running title: Need for Prospective Disaster Survey Panels

Abstract

Disasters are typically unforeseen, causing most social and behavioral studies about disasters to be reactive. Occasionally, pre-disaster data are available, for example when disasters happen while a study is already in progress or where data collected for other purposes already exist, but planned pre-post designs are all but non-existent. This gap fundamentally limits the quantification of disasters' human toll. Anticipating, responding to, and managing public reactions requires a means of tracking and understanding those reactions, collected using rigorous scientific methods. Oftentimes, self-reports from the public are the best or only source of information like perceived risk, behavioral intentions, and social learning. Significant advancement in disaster research, to best inform practice and policy, requires well-designed surveys with large probability-based samples and longitudinal assessment of individuals across the life-cycle of a disaster and across multiple disasters.

Keywords: Disaster, public reaction, panel study, survey

On the Need for Prospective Disaster Survey Panels

Research has a familiar rhythm after every disaster. In the wake of each hurricane, earthquake, or flood, experts set about assessing the damage to roads, bridges, and other infrastructure and comparing it to conditions before the disaster. But understanding how human beings respond to emergencies is not always part of the routine, largely because a lack of pre-disaster data makes before and after comparisons difficult or impossible.

Most social and behavioral scientific studies about disasters are reactive because disasters are typically unforeseen. On rare occasions, pre-disaster data are available because disasters happen while a study is already in progress. This was the case with the 1985 Chernobyl nuclear accident, which occurred during a survey on the perceived risk of nuclear power.[1] Sometimes we can capitalize on past work, as when Hurricane Harvey devastated Houston and the Texas coast in 2017. With funding from the National Science Foundation, we built on a survey we fielded after the 2010 Deepwater Horizon oil spill and followed up with the same participants.[2,3] But these examples are the exception, not the rule; pre-disaster survey data are rarely available and even more rarely planned. This lack of a pre-post comparison fundamentally limits the quantification of a disaster's human toll and stands in stark contrast to our ability to assess infrastructure and other damage.

This lack of pre-event data is a problem because human responses to disasters often determine resilience and recovery. The public is a critical partner for local, state, and federal agencies in disaster response.[4,5] Public perceptions drive public reaction, both immediately (protective behavior, evacuation decisions) and over the long term (migration, market demand, and pressure on policymakers). Anticipating, responding to, and managing public reactions requires a means of tracking and understanding those reactions. Self-reports from the public can be the best or only source of information like perceived risk, behavioral intentions, and social learning. To best inform intervention and policy, that information needs to be collected using rigorous scientific methods, including well-designed surveys with large probability-based samples and longitudinal assessment of individuals across the life-cycle of a disaster and across multiple disasters.[6]

Our experience illustrates the need for disaster surveys that are prospective, rather than reactive. We designed our 2017 Hurricane Harvey survey to leverage the 2016 Study of Trauma, Resilience, and Opportunity among Neighborhoods in the Gulf (STRONG),[7] conducted by the Consortium for Resilient Gulf Coast Communities. STRONG is a regionally representative survey of 2,520 Gulf Coast residents that assessed the long-term health, economic, and social consequences of the Deepwater Horizon oil spill. The STRONG survey included many public response measures—mental and physical health, financial well-being, social support, perceived exposure, perceived risk—that were relevant to Hurricane Harvey but were fundamentally designed for a different purpose.

In response to Harvey, we re-contacted the 623 STRONG respondents in Houston and coastal Texas and obtained longitudinal data from 295 (a 47.4 percent retention rate). These data provide valuable insights into the human impacts of a hurricane the size and scale of Harvey, helping us understand how people's prior exposure to a disaster affects their response to a new one, and how new disasters impact recovery from prior disasters. What was missing—and is missing from most studies—was a prospective research infrastructure designed to capture exactly this sort of representative, longitudinal data. Researchers need longitudinal data that include pre-event (baseline) data collected for this purpose, assessment throughout acute disaster phases, and long-term public reactions. Researchers also need a use-

inspired[8,9] approach that supplies data for a broad set of research and practice needs, and allows the easy integration of other data sources.

We conducted a mapping review of the current state of academic disaster survey research over the past twenty years. We searched two large, general databases (SCOPUS and Web of Science) for journal articles between 1998 and 2018 about large-scale, probability-sampled surveys of public reactions to U.S. disasters.[10] Our initial search identified a substantial literature of 3,103 documents, but just 79 matched our criteria because most studies lacked strong probability sampling methods, which are crucial to ensure that the surveyed sample reflects the overall population.

The studies covered diverse events: 31 articles on terrorist attacks (primarily about September 11), 21 on disease outbreaks (primarily H1N1 and Ebola), 10 on hurricanes (primarily Katrina and Ike), and four on the Deepwater Horizon oil spill (Multiple forthcoming papers from our own team will add to this list for Deepwater Horizon and Hurricane Harvey). Other studies covered drought, earthquake, and U.S. reactions to the combined earthquake, tsunami, and nuclear accident affecting Japan's Fukushima Daiichi power plant. Just three articles addressed multiple disasters.

Most articles focused on narrow outcomes (e.g., risk perception, mental health, physical health), rather than capturing a breadth of psychological, health, economic, and social effects. What is remarkable about this literature is how often it appeared to be reactive: just 19 articles (24%) involved pre-disaster data. Most built off existing data and samples originally collected for other purposes, as we did with STRONG. Five were ongoing studies that re-oriented or added capacity because of the disaster, as was done with the Chernobyl study. None were planned pre-post designs. In addition, relatively few (28 of 79; 35%) articles reported data that were collected within one month of the disaster event. Most articles (56 of 79; 71%) reported data collected during the extended recovery period (Figure 1).

Moving forward, the research community needs planned assessments of public reaction to disasters to inform science and communication, and make the public a more effective response partner. This requires a research infrastructure for tracking public fears, understanding, and behavior— preferably in near-real time. The National Science Foundation (NSF) recently took an important step in this direction, taking a powerful model for quickly and nimbly fielding geoscientists and engineers to capture perishable post-disaster data, through its Geotechnical Extreme Events Reconnaissance (GEER) program,[11] and extending the model to the social sciences (SSEER) and interdisciplinary efforts (ISEER).[12] These programs place scientists on the ground in disaster zones and are critical to our understanding of human dynamics immediately after a disaster. Federal granting agencies (notably NSF and the National Institutes of Health) also employ rapid grant programs for quickly fielding research after disasters, but these efforts are by their very nature delayed because they are reactive (our Hurricane Harvey study was funded through an NSF RAPID grant).

What we do not have is the pre-positioned capacity to nimbly and longitudinally capture public response, at a population level, from pre-event baseline, through acute disaster phases, and into what is now known to be an extensive recovery period.[13, 14] Laying the groundwork for this necessary data collection will take planning and investment. Operationally, this will likely involve a large-scale panel study. The United States invests in many such nationwide studies, such as the Health and Retirement Study and the Panel Study on Income Dynamics, but a disaster panel would need to be more nimble and adaptive than such studies. Developing this panel study will require substantial innovation and attention

to not only theoretical and methodological detail, but also to the practical needs of the communities, policymakers, and disaster responders.

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Pre-event
Data collected as part of a *planned* pre-post design

Threat emergence
Data collected within 1 month of disaster event

Extended recovery
Data collected 1 month or longer after disaster event

0%
(24% used other pre-disaster data)

35%

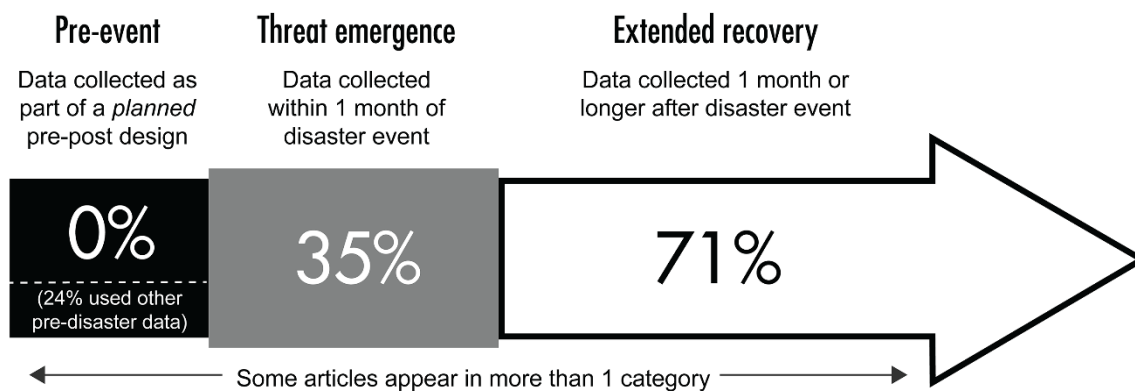71%

Some articles appear in more than 1 category

Figure 1. The proportion of 1998-2018 journal articles with probability-sampled surveys at different disaster stages, demonstrating how disaster survey research tends not to be prospective